



SEQUENCE LISTING

<110> DeAngelis, Paul
Jing, Wei

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Phe Gln Ala Ser Ala Ala Arg Asn Met Gly Leu Arg Leu Ala Lys Tyr
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Met Asn Phe Ser Ala Leu Thr His Asp Trp Ile Glu Lys Ile Asn Ala
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Leu Asp Ile Ala Thr Gln Leu Leu Ser Asn Val Lys Lys Leu Thr
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Lys Thr Asn Tyr Pro Phe Glu Val Val Ala Asp Asp Gly Ser Lys
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210 215 220

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Ser Lys Gly Asn Ile Ser Leu Asp Trp Arg Leu Glu His Phe Lys Lys
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Lys Ile Ala Val Ser Ile Phe Tyr Pro Asn Thr Leu Asn Gly Leu Val
705 710 715 720

Lys Lys Leu Asn Asn Ile Ile Glu Tyr Asn Lys Asn Ile Phe Val Ile
Page 11

725

730

735

Ile Leu His Val Asp Lys Asn His Leu Thr Pro Asp Ile Lys Lys Glu
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Ile Leu Ala Phe Tyr His Lys His Gln Val Asn Ile Leu Leu Asn Asn
755 760 765

Asp Ile Ser Tyr Tyr Thr Ser Asn Arg Leu Ile Lys Thr Glu Ala His
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His Asp Trp Ile Glu Lys Ile Asn Ala His Pro Pro Phe Lys Lys Leu
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Glu Leu Gly Ile Thr Lys Glu Arg Leu Gly Ala Pro Pro Leu Val Ser
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Ile Ile Met Thr Ser His Asn Thr Glu Lys Phe Ile Glu Ala Ser Ile
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Asn Ser Leu Leu Leu Gln Thr Tyr Asn Leu Glu Val Ile Val Val Asp
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Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala Ser Arg Ile Ala Asn
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Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn Ser Asn Leu Gly Thr
145 150 155 160

Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser Lys Gly Asp Ile Ile
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Phe Phe Gln Ser Asp Asp Val Cys His His Glu Arg Ile Glu Arg Cys
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Val Asn Ala Leu Leu Ser Asn Lys Asp Asn Ile Ala Val Arg Cys Ala
195 200 205

Tyr Ser Arg Ile Asn Leu Glu Thr Gln Asn Ile Ile Lys Val Asn Asp
Page 14

210

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Asn Lys Tyr Lys Leu Gly Leu Ile Thr Leu Gly Val Tyr Arg Lys Val
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Phe Asn Glu Ile Gly Phe Phe Asn Cys Thr Thr Lys Ala Ser Asp Asp
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Glu Phe Tyr His Arg Ile Ile Lys Tyr Tyr Gly Lys Asn Arg Ile Asn
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Phe Ser Asp Met Val Glu Trp Val Asp Glu Asn Asn Ile Lys Gln Lys
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Thr Ser Asp Ala Arg Gln Asn Tyr Leu His Glu Phe Gln Lys Ile His
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Asn Glu Arg Lys Leu Asn Glu Leu Lys Glu Ile Phe Ser Phe Pro Arg
325 330 335

Ile His Asp Ala Leu Pro Ile Ser Lys Glu Met Ser Lys Leu Ser Asn
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Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile Pro Ser Arg Ile
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Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu Lys Asn Gln Cys Asp His
370 375 380

Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu Val Pro Asp Phe Ile Lys
385 390 395 400

Lys Leu Gly Asn Lys Ala Thr Val Ile Asn Cys Gln Asn Lys Asn Glu
405 410 415

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Glu Asn Lys Asp Gly Tyr Tyr Ile Thr Cys Asp Asp Ile Arg Tyr
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Pro Ala Asp Tyr Thr Asn Thr Met Ile Lys Lys Ile Asn Lys Tyr Asn
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Asp Lys Ala Ala Ile Gly Leu His Gly Val Ile Phe Pro Ser Arg Val
Page 15

465

470

475

480

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Leu Glu Asn Asp Thr Ala Val Asn Ile Leu Gly Thr Gly Thr Val Ala
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Pro Gly Met Val Asp Ile Tyr Phe Ser Ile Leu Cys Lys Lys Asn Asn
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Ile Gln Ser Lys Leu Ile Ile Ser Asn Asn Pro Trp Gly Tyr Ser Ser
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 Page 17

35

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45

Leu Leu Ala Lys Gln Asp Ser Lys His Pro Leu Ser Ala Ser Leu Glu
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Phe Glu Lys Ile Tyr Thr Tyr Asn Gln Ala Leu Glu Ala Lys Leu Glu
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Lys Asp Lys Gln Thr Thr Ser Ile Thr Asp Leu Tyr Asn Glu Val Ala
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Lys Ser Asp Leu Gly Leu Val Lys Glu Thr Asn Ser Val Asn Pro Leu
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Val Ser Ile Ile Met Thr Ser His Asn Thr Ala Gln Phe Ile Glu Ala
130 135 140

Ser Ile Asn Ser Leu Leu Leu Gln Thr Tyr Lys Asn Ile Glu Ile Ile
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Ile Val Asp Asp Asp Ser Ser Asp Asn Thr Phe Glu Ile Ala Ser Arg
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Leu Gly Thr Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser Lys Gly
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Ile Glu Arg Cys Val Asn Ile Leu Leu Ala Asn Lys Glu Thr Ile Ala
225 230 235 240

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260 265 270

His Arg Lys Val Phe Gln Glu Ile Gly Phe Phe Asn Cys Thr Thr Lys
275 280 285

Gly Ser Asp Asp Glu Phe Phe His Arg Ile Ala Lys Tyr Tyr Gly Lys
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Glu Lys Ile Lys Asn Leu Leu Leu Pro Leu Tyr Tyr Asn Thr Met Arg
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Glu Asn Ser Leu Phe Thr Asp Met Val Glu Trp Ile Asp Asn His Asn
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Gln Ala Met His Asn Glu Thr Ala Ser His Asp Phe Lys Asn Leu Phe
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Gln Phe Pro Arg Ile Tyr Asp Ala Leu Pro Val Pro Gln Glu Met Ser
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Lys Leu Ser Asn Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile
385 390 395 400

Pro Ser Arg Ile Ala Gln Leu Arg Arg Ile Ile Gly Ile Leu Lys Asn
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Gln Cys Asp His Phe His Ile Tyr Leu Asp Gly Tyr Val Glu Ile Pro
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Asp Phe Ile Lys Asn Leu Gly Asn Lys Ala Thr Val Val His Cys Lys
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Glu Leu Ile Glu Lys Asn Gln Asp Gly Tyr Tyr Ile Thr Cys Asp Asp
465 470 475 480

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485 490 495

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515 520 525

Phe Tyr Lys Pro Leu Glu Lys Asp Lys Ala Val Asn Val Leu Gly Thr
530 535 540

Gly Thr Val Ser Phe Arg Val Ser Leu Phe Asn Gln Phe Ser Leu Ser
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545

550

555

560

Asp Phe Thr His Ser Gly Met Ala Asp Ile Tyr Phe Ser Leu Leu Cys
565 570 575

Lys Lys Asn Asn Ile Leu Gln Ile Cys Ile Ser Arg Pro Ala Asn Trp
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595 600 605

Asp Asn Asp Glu Gln Gln Thr Gln Leu Ile Met Glu Asn Gly Pro Trp
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His Pro Ser Val Asn Ser Ala His Leu Ser Val Asn Lys Glu Glu Lys
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Val Asn Val Cys Asp Ser Pro Leu Asp Ile Ala Thr Gln Leu Leu Leu
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Ser Asn Val Lys Lys Leu Val Leu Ser Asp Ser Glu Lys Asn Thr Leu
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Ser Ile Ile Val Thr Thr Phe Asn Arg Pro Ala Ile Leu Ser Ile Thr
165 170 175

Leu Ala Cys Leu Val Asn Gln Lys Thr His Tyr Pro Phe Glu Val Ile
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Val Thr Asp Asp Gly Ser Gln Glu Asp Leu Ser Pro Ile Ile Arg Gln
195 200 205

Tyr Glu Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Asn Gly
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Phe Gln Ala Ser Ala Ala Arg Asn Met Gly Leu Arg Leu Ala Lys Tyr
225 230 235 240

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Ile Gly Pro Arg Lys Tyr Ile Asp Thr Gln His Ile Asp Pro Lys Asp
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595 600 605

Glu Asn Ala Val Asp Tyr Asp Met Phe Leu Lys Leu Ser Glu Val Gly
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cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgattttagat	2040
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 <211> 1614
 <212> DNA
 <213> *Pasteurella multocida*

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<210> 14
 <211> 966
 <212> DNA
 <213> *Pasteurella multocida*

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<210> 15
 <211> 1821
 <212> DNA
 <213> *Pasteurella multocida*

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	aataaaattgg	atattcgta	cgtcagacaa	aaagataacg	gtttcaagc	cagtggcgct	240
	cggaaatatgg	gattacgctt	agcaaaatat	gactttattt	gcttactcga	ctgtgatatg	300
	gcgccaaattc	cattatgggt	tcattcttat	gttcagagc	tattagaaga	tgtgattta	360
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	aataacgcga	gtttgcttga	atcattacca	gaagtggaaa	ccaataatag	tgtgcccga	480
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<210> 16
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

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	aaatgcaaag	aaaaactctc	agcacatcct	tctgttaatt	cagcacatct	ttctgtaaat	180
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	tccaacgtaa	aaaaattagt	actttctgac	tcggaaaaaa	acacgttaaa	aaataaatgg	300
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	gatctatcac	cgatcattcg	ccaatatgaa	aataaattgg	atattcgcta	cgtcagacaa	660

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cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgattttagat	2040
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aaagatattt aa	2112

<210> 17
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 17 atgaatacat tatcacaagc aataaaagca tataacagca atgactatca attagcactc	60
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aaatgcaaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat	180
aaagaagaaaa aagtcaatgt ttgcgtatgt ccgttagata ttgcaacaca actgttactt	240

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<210> 18
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

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<210> 19
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 <211> 1704
 <212> DNA
 <213> *Pasteurella multocida*

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<211> 18

<212> PRT

<213> artificial sequence

<220>

<223> synthetic peptide based on residues 526-543 of pmHAS

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Lys Glu

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<211> 24
<212> DNA
<213> Artificial sequence

<220>
<223> primer Pm10

<400> 23
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<210> 24
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<220>
<223> primer Pm21

<400> 24
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<210> 25
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<220>
<223> synthetic peptide based on residues 526 to 544 of pmHAS protein

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<211> 1980
<212> DNA
<213> *Pasteurella multocida*

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<213> <i>Pasteurella multocida</i>	
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 <211> 1830
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tatcgcttat tccgttacgg tagttcttt aaaactattg atggcattat ggcctaccat	900
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<210> 30
 <211> 1764
 <212> DNA
 <213> *Pasteurella multocida*

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catgttggtc tttctattat cgttacaaca ttcaatcgac cagcaatttt atcgattaca	180
ttagcctgtt tagtaaacca aaaaacacat taccgtttg aagttatcgt gacagatgt	240
ggtagtcagg aagatctatc accgatcatt cgccaatatg aaaataaatt ggatattcgc	300
tacgtcagac aaaaagataa cggtttcaa gccagtgccg ctcggaatat gggattacgc	360
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gttcattctt atgttgcaga gctattagaa gatgatgatt taacaatcat tggtccaaga	480
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gaatcattac cagaagtgaa aaccaataat agtgttgcgc caaaaggaa aggaacagtt	600
tctctggatt ggcgcctt acaattcgaa aaaacagaaa atctccgc ttatccgattcg	660
cccttccgtt ttttgcggc gggtaatgtt gcttcgcta aaaaatggct aaataaatcc	720
ggtttctttg atgaggaatt taatcactgg ggtggagaag atgtggaaatt tggatatcgc	780
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gtttagtca atcagtcatt aaatagacaa ggcataactt attataatta tgacgaattt	1680
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<210> 31
 <211> 2007
 <212> DNA
 <213> *Pasteurella multocida*

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gatctatcac cgatcattcg ccaatatgaa aataaaattgg atattcgta cgtcagacaa	660
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gactttattt gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattttat	780
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acacaacata ttgacccaaa agacttctt aataacgcga gtttgcttga atcattacca	900
gaagtgaaaaa ccaataatag tggccgca aaaggggaag gaacagttt cttggattgg	960
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<210> 33
<211> 2112
<212> DNA
<213> *Pasteurella multocida*

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aaagaagaaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt 240  
tccaaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg 300  
aaattgctca ctqqaqaqaa atctqaaaat qcqqqaqtaa qaqcqqtac ccttotacca 360
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tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta	540
gtAAACCAaaa aaACACATTA CCCGTTGAA gttatcgta cagatgatgg tagtcaggaa	600
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gataACACAT caattaAGAA acttggcatt caaaAGAAAA accATTTGT tGTAGTCAAT	1980
cagtCATTAA atagacaAGG cataACTTAT tataATTATG acgaATTGTA tgatTTAGAT	2040
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aaAGATATTt AA	2112

<210> 34
<211> 2112

<212> DNA
<213> Pasteurella multocida

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<210> 35
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 35	
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aaagatattt aa	2112

<210> 36
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

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<210> 37
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

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<210> 38
<211> 2112
<212> DNA
<213> *Pasteurella multocida*

<400> 38

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cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgattttagat	2040
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<210> 39

<211> 2112

<212> DNA

<213> *Pasteurella multocida*

<400> 39

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cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttat	2040
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<210> 40
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

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<210> 41
<211> 2112
<212> DNA
<213> *Pasteurella multocida*

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<210> 42
 <211> 2112
 <212> DNA
 <213> Pasteurella multocida

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<210> 43
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<212> DNA
<213> *Pasteurella multocida*

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<210> 44
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 <213> *Pasteurella multocida*

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	aaagataacg	gtttcaagc	cagtgccgt	cgaaatatgg	gattacgctt	agcaaaatat	720
	gactttattt	gcttactcg	ctgtgatatg	gcgcacatc	cattatgggt	tcattttat	780
	gttgcagac	tattagaaga	tgatgattt	acaatcattt	gtccaaagaaa	atacatcgat	840
	acacaacata	ttgacccaaa	agacttctt	aataacgcga	gtttgcttga	atcattacca	900
	gaagtgaaaa	ccaataatag	tttgccgca	aaaggggaaag	gaacagttt	tctggattgg	960
	cgcttagaac	aattcgaaaa	aacagaaaaat	ctccgcttat	ccgattcgcc	tttccgtttt	1020
	tttgcggcgg	gtaatgttgc	tttcgctaaa	aatggctaa	ataaaatccgg	tttctttgt	1080
	gaggaattt	atcactgggg	tggagaagat	gtggaaattt	gatatcgctt	attccgttac	1140

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agtgaagttg	gaaaatttaa	acatcttaat	aaaatctgct	ataaccgtgt	attacatgg	1920
gataacacat	caattaagaa	acttggcatt	caaaagaaaa	accattttgt	tgtgtcaat	1980
cagtcattaa	atagacaagg	cataacttat	tataattatg	acgaatttga	tgattttagat	2040
gaaaagtagaa	agtatatttt	caataaaacc	gctgaatatc	aagaagagat	tgtatctta	2100
aaagatattt	aa					2112

<210> 45
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 45	atgaatacat	tatcacaagc	aataaaagca	tataacagca	atgactatca	attagcactc	60
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	aaatgcaaag	aaaaactctc	agcacatcct	tctgttaatt	cagcacatct	ttctgtaaat	180
	aaagaagaaa	aagtcaatgt	ttgcgatagt	ccgttagata	ttgcaacaca	actgttactt	240
	tccaacgtaa	aaaaattagt	acttctgac	tcggaaaaaa	acacgttaaa	aaataaatgg	300
	aaattgctca	ctgagaagaa	atctgaaaat	gcggaggtaa	gagcggcgc	ccttgcacca	360
	aaagattttc	ccaaagatct	ggttttagcg	ccttacctg	atcatgttaa	tgatttaca	420
	tgttacaaaa	agcgaaagaa	aagacttggc	ataaaacctg	aacatcaaca	tgttggtctt	480
	tctattatcg	ttacaacatt	caatcgacca	gcaattttat	cgattacatt	agcctgttta	540
	gtttacaaaa	aaacacatta	cccgtttcaa	gttacgtga	cagatgtgg	tagtcaggaa	600
	gatctatcac	cgatcattcg	ccaatatgaa	aataaattgg	atattcgcta	cgtcagacaa	660
	aaagataacg	gtttcaagc	cagtgcgc	cgaaatatgg	gattacgctt	agcaaaatat	720

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cagtcattaa	atagacaagg	cataactt	tataattatg	acgaatttga	tgattttagat	2040
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aaagatattt	aa					2112

<210> 46
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 46	atgaatacat	tatcacaagc	aataaaagca	tataacagca	atgactatca	attagcactc	60
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	aaatgcaaag	aaaaactctc	agcacatcct	tctgttaatt	cagcacatct	ttctgtaaat	180
	aaagaagaaa	aagtcaatgt	ttgcgtatgt	ccgttagata	ttgcaacaca	actgttactt	240

tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg	300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca	360
aaagatttgc ccaaagatct ggttttagcg ccttacctg atcatgttaa tgattttaca	420
tggtacaaaa agcgaagaa aagacttggc ataaaacctg aacatcaaca tggatgttt	480
tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta	540
gttacaaaaaa aaacacatta cccgtttgaa gttatcgta cagatgtgg tagtcaggaa	600
gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgta cgtcagacaa	660
aaagataacg gtttcaagc cagtgccgct cgaaatatgg gattacgctt agcaaaat	720
gactttatttgc gtttactcgta ctgtgatatg ggcggccatc cattatgggt tcattttat	780
gttgcagagc tattagaaga tgatgatttacaatcatttgc gttcaagaaa atacatcgat	840
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gaagtgaaaa ccaataatag tggccgca aaaggaaag gaacagtttgc tctggattgg	960
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gataacacat caattaagaa acttggcatt caaaagaaaa accatgggtt tggatgttgc	1980
cagtcattaa atagacaagg cataacttgc tataattatg acgaatttgc tgatgttgc	2040
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aaagatattt aa	2112

<210> 47
<211> 2112
<212> DNA
<213> *Pasteurella multocida*

<400> 47
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aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat 180
aaagaagaaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt 240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg 300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggcgc ccttgtacca 360
aaagattttc ccaaagatct gtttttagcg ctttacctg atcatgttaa tgattttaca 420
tggtacaaaa agcgaagaa aagacttggc ataaaacctg aacatcaaca tgggttctt 480
tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta 540
gttaaaccaaa aaacacatta cccgttgaa gttatcgta cagatgtgg tagtcaggaa 600
gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgta cgtcagacaa 660
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gactttatttgc gtttactcg ctgtgatatg gtcggccatc cattatgggt tcattttat 780
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cagtcattaa	atagacaagg	cataacttat	tataattatg	acgaatttga	tgattnagat	2040
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aaagatattt	aa					2112

<210> 48
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

<400> 48	atgaatacat	tatcacaagc	aataaaagca	tataacagca	atgactatca	attagcactc	60
	aaatttattt	aaaagtccgc	ggaaatctat	ggacggaaaa	ttgttgaatt	tcaaattacc	120
	aaatgcaaag	aaaaactctc	agcacatcct	tctgttaatt	cagcacatct	ttctgtaaat	180
	aaagaagaaa	aagtcaatgt	ttgcgatagt	ccgttagata	ttgcaacaca	actgttactt	240
	tccaacgtaa	aaaaattagt	actttctgac	tcggaaaaaa	acacgttaaa	aaataaatgg	300
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	aaagatttc	ccaaagatct	gtttttagcg	cctttagctg	atcatgttaa	tgattttaca	420
	tggtacaaaa	agcgaaagaa	aagacttggc	ataaaacctg	aacatcaaca	tgttggtctt	480
	tctattatcg	ttacaacatt	caatcgacca	gcaattttat	cgattacatt	agcctgttta	540
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	gatctatcac	cgatcattcg	ccaatatgaa	aataaattgg	atattcgct	cgtcagacaa	660
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	acacaacata	ttgacccaaa	agacttctta	aataacgcga	gtttgcttga	atcattacca	900
	gaagtgaaaa	ccaataatag	tgttgcgcga	aaaggggaaag	gaacagttt	tctggattgg	960
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	tttgcggcgg	gtaatgttgc	tttcgctaaa	aaatggctaa	ataaattccgg	tttctttgtat	1080
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	ggtagttct	ttaaaaactat	tgatggcatt	atggcctacc	atcaagagcc	accaggtaaa	1200
	gaaaatgaaa	ccgatcgtga	agcggaaaaa	aatattacgc	tcgatattat	gagagaaaaag	1260

gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagagtacct	1320
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gataacacat caattaagaa acttggcatt caaaagaaaa accattttgt tgttagtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
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aaagatattt aa	2112

<210> 49
<211> 2112
<212> DNA
<213> *Pasteurella multocida*

<400> 49 atgaatacat tatacacaaggc aataaaaagca tataacagca atgactatca attagcactc 60
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aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgttaat 180
aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt 240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg 300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc cttgtacca 360
aaagattttc ccaaagatct ggtttagcg ctttacctg atcatgttaa tgattttaca 420
tggtacaaaa agcgaagaaa aagacttggc ataaaacctg aacatcaaca tgttggctt 480
tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta 540
gtaaacccaaa aaacacattt cccgttgaa gttatcgtga cagatgtatgg tagtcaggaa 600
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aaagataacg gtttcaagc cagtggcgct cggaaatatgg gattacgctt agcaaaatat 720
gactttatttgc gcttactcga ctgtgatatg gcgccaaatc cattatgggt tcattcttat 780
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tctaaaccaa atggcggaat agcctcagca tcaaattgcag ccgtttcttt tgctaaaggt	1560
tattacattt ggcagttaga ttcagatgat tatcttgagc ctgatgcagt tgaactgtgt	1620
ttaaaagaat tttaaaaga taaaacgcta gcttgggttt ataccactaa tagaaacgtc	1680
aatccggatg gtagcttaat cgctaattggt tacaattggc cagaattttc acgagaaaaaa	1740
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agtgaagttt gaaaattttaa acatcttaat aaaatctgct ataaccgtgt attacatgg	1920
gataacacat caattaagaa acttggcatt caaaagaaaa accatttgt tgtgtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgatttagat	2040
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<210> 50
 <211> 2112
 <212> DNA
 <213> *Pasteurella multocida*

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aaagaagaaa aagtcaatgt ttgcgtatgt ccgttagata ttgcaacaca actgttactt	240
tccaacgtaa aaaaatttagt acttctgac tcggaaaaaa acacgttaaa aaataaatgg	300
aaattgctca ctgagaagaa atctgaaaaat gcggaggtaa gagcggtcgc cttgtacca	360

<210> 51
<211> 2136
<212> DNA

<213> *Pasteurella multocida*

<400> 51
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cagtcattaa atagacaagg catcaattat tataattatg acaaatttga tgatttagat	2040
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<213> Pasteurella multocida

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35 40 45

Gln Ser Lys Ser Asn Lys Ile Glu Glu Asp Asn Ile Ser Gly Glu Asn
50 55 60

Glu Phe Ser Val Ser Ile Lys Asp Leu Tyr Asn Glu Ile Ser Asn Ser
65 70 75 80

Glu Leu Gly Ile Thr Lys Glu Arg Leu Gly Ala Pro Pro Leu Val Ser
85 90 95

Ile Ile Met Thr Ser His Asn Thr Glu Lys Phe Ile Glu Ala Ser Ile
100 105 110

Asn Ser Leu Leu Leu Gln Thr Tyr Asn Asn Leu Glu Val Ile Val Val
115 120 125

Asp Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala Ser Arg Ile Ala
130 135 140

Asn Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn Ser Asn Leu Gly
145 150 155 160

Thr Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser Lys Gly Asp Ile
165 170 175

Ile Phe Phe Gln Asp Ser Asp Asp Val Cys His His Glu Arg Ile Glu
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Arg Cys Val Asn Ala Leu Leu Ser Asn Lys Asp Asn Ile Ala Val Arg
195 200 205

Cys Ala Tyr Ser Arg Ile Asn Leu Glu Thr Gln Asn Ile Ile Lys Val
210 215 220

Asn Asp Asn Lys Tyr Lys Leu Gly Leu Ile Thr Leu Gly Val Tyr Arg
225 230 235 240

Lys Val Phe Asn Glu Ile Gly Phe Phe Asn Cys Thr Thr Lys Ala Ser
245 250 255

Asp Asp Glu Phe Tyr His Arg Ile Ile Lys Tyr Tyr Gly Lys Asn Arg
260 265 270

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275 280 285

Ser Leu Phe Ser Asp Met Val Glu Trp Val Asp Glu Asn Asn Ile Lys
290 295 300

Gln Lys Thr Ser Asp Ala Arg Gln Asn Tyr Leu His Glu Phe Gln Lys
305 310 315 320

Ile His Asn Glu Arg Lys Phe Asn Glu Leu Lys Glu Ile Phe Ser Phe
325 330 335

Pro Arg Ile His Asp Ala Leu Pro Ile Ser Lys Glu Met Ser Lys Leu
340 345 350

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Arg Ile Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu Lys Asn Gln Cys
370 375 380

Asp His Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu Val Pro Asp Phe
385 390 395 400

Ile Lys Lys Leu Gly Asn Lys Ala Thr Val Ile Asn Cys Gln Asn Lys
405 410 415

Asn Glu Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu Leu Glu Lys Leu
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Ile Lys Glu Asn Lys Asp Gly Tyr Tyr Ile Thr Cys Asp Asp Asp Ile
435 440 445

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Tyr Asn Asp Lys Ala Ala Ile Gly Leu His Gly Val Ile Phe Pro Ser
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Lys Thr Phe Arg Lys
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 <400> 63

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35 40 45

Lys Leu Asn Pro Val Ile Pro Asp Lys Asp Tyr Lys Asp Val Gly Lys
50 55 60

Phe Ile Phe Pro Cys Ala Lys Asn Asp Met Ile Val Leu Thr Asp Asp
65 70 75 80

Asp Ile Ile Tyr Pro Pro Asp Tyr Val Glu Lys Met Leu Asn Phe Tyr
85 90 95

Asn Ser Phe Ala Ile Phe Asn Cys Ile Val Gly Ile His Gly Cys Ile
100 105 110

Tyr Ile Asp Ala Phe Asp Gly Asp Gln Ser Lys Arg Lys Val Phe Ser
115 120 125

Phe Thr Gln Gly Leu Leu Arg Pro Arg Val Val Asn Gln Leu Gly Thr
130 135 140

Gly Thr Val Phe Leu Lys Ala Asp Gln Leu Pro Ser Leu Lys Tyr Met
145 150 155 160

Asp Gly Ser Gln Arg Phe Val Asp Val Arg Phe Ser Arg Tyr Met Leu
165 170 175

Glu Asn Glu Ile Gly Met Ile Cys Val Pro Arg Glu Lys Asn Trp Leu
180 185 190

Arg Glu Val Ser Ser Gly Ser Met Glu Gly Leu Trp Asn Thr Phe Thr
195 200 205

Lys Lys Trp Pro Leu Asp Ile Ile Lys Glu Thr Gln Ala Ile Ala Gly
210 215 220

Tyr Ser Lys Leu Asn Leu Glu Leu Val Tyr Asn Val Glu Gly
225 230 235

<210> 64
<211> 520
<212> PRT
<213> Escherichia coli

<400> 64

Met Asn Ala Glu Tyr Ile Asn Leu Val Glu Arg Lys Lys Lys Leu Gly
Page 76

1

5

10

15

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20 25 30

Val Asp Leu Gln His Lys Asn Ser Pro Leu Lys Gly Asn Asp Asn Leu
35 40 45

Ile His Lys Arg Ile Asn Glu Tyr Asp Asn Val Leu Glu Leu Ser Lys
50 55 60

Asn Val Ser Ala Gln Asn Ser Gly Asn Glu Phe Ser Tyr Leu Leu Gly
65 70 75 80

Tyr Ala Asp Ser Leu Arg Lys Val Gly Met Leu Asp Thr Tyr Ile Lys
85 90 95

Ile Val Cys Tyr Leu Thr Ile Gln Ser Arg Tyr Phe Lys Asn Gly Glu
100 105 110

Arg Val Lys Leu Phe Glu His Ile Ser Asn Ala Leu Arg Tyr Ser Arg
115 120 125

Ser Asp Phe Leu Ile Asn Leu Ile Phe Glu Arg Tyr Ile Glu Tyr Ile
130 135 140

Asn His Leu Lys Leu Ser Pro Lys Gln Lys Asp Phe Tyr Phe Cys Thr
145 150 155 160

Lys Phe Ser Lys Phe His Asp Tyr Thr Lys Asn Gly Tyr Lys Tyr Leu
165 170 175

Ala Phe Asp Asn Gln Ala Asp Ala Gly Tyr Gly Leu Thr Leu Leu Leu
180 185 190

Asn Ala Asn Asp Asp Met Gln Asp Ser Tyr Asn Leu Leu Pro Glu Gln
195 200 205

Glu Leu Phe Ile Cys Asn Ala Val Ile Asp Asn Met Asn Ile Tyr Arg
210 215 220

Ser Gln Phe Asn Lys Cys Leu Arg Lys Tyr Asp Leu Ser Glu Ile Thr
225 230 235 240

Asp Ile Tyr Pro Asn Lys Ile Ile Leu Gln Gly Ile Lys Phe Asp Lys
245 250 255

Lys Lys Asn Val Tyr Gly Lys Asp Leu Val Ser Ile Ile Met Ser Val
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260

265

270

Phe Asn Ser Glu Asp Thr Ile Ala Tyr Ser Leu His Ser Leu Leu Asn
275 280 285

Gln Thr Tyr Glu Asn Ile Glu Ile Leu Val Cys Asp Asp Cys Ser Ser
290 295 300

Asp Lys Ser Leu Glu Ile Ile Lys Ser Ile Ala Tyr Ser Ser Ser Arg
305 310 315 320

Val Lys Val Tyr Ser Ser Arg Lys Asn Gln Gly Pro Tyr Asn Ile Arg
325 330 335

Asn Glu Leu Ile Lys Lys Ala His Gly Asn Phe Ile Thr Phe Gln Asp
340 345 350

Ala Asp Asp Leu Ser His Pro Glu Arg Ile Gln Arg Gln Val Glu Val
355 360 365

Leu Arg Asn Asn Lys Ala Val Ile Cys Met Ala Asn Trp Ile Arg Val
370 375 380

Ala Ser Asn Gly Lys Ile Gln Phe Phe Tyr Asp Asp Lys Ala Thr Arg
385 390 395 400

Met Ser Val Val Ser Ser Met Ile Lys Lys Asp Ile Phe Ala Thr Val
405 410 415

Gly Gly Tyr Arg Gln Ser Leu Ile Gly Ala Asp Thr Glu Phe Tyr Glu
420 425 430

Thr Val Ile Met Arg Tyr Gly Arg Glu Ser Ile Val Arg Leu Leu Gln
435 440 445

Pro Leu Ile Leu Gly Leu Trp Gly Asp Ser Gly Leu Thr Arg Asn Lys
450 455 460

Gly Thr Glu Ala Leu Pro Asp Gly Tyr Ile Ser Gln Ser Arg Arg Glu
465 470 475 480

Tyr Ser Asp Ile Ala Ala Arg Gln Arg Val Leu Gly Lys Ser Ile Val
485 490 495

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Asp Val Ser Gly Ile Ile Glu Gln

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520

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35 40 45

Pro Ser Pro Asp His Phe Trp Pro Arg Phe Pro Asp Ala Leu Arg Pro
50 55 60

Phe Phe Pro Trp Asp Gln Leu Glu Asn Glu Asp Ser Ser Val His Ile
65 70 75 80

Ser Pro Arg Gln Lys Arg Asp Ala Asn Ser Ser Ile Tyr Lys Gly Lys
85 90 95

Lys Cys Arg Met Glu Ser Cys Phe Asp Phe Thr Leu Cys Lys Lys Asn
100 105 110

Gly Phe Lys Val Tyr Val Tyr Pro Gln Gln Lys Gly Glu Lys Ile Ala
115 120 125

Glu Ser Tyr Gln Asn Ile Leu Ala Ala Ile Glu Gly Ser Arg Phe Tyr
130 135 140

Thr Ser Asp Pro Ser Gln Ala Cys Leu Phe Val Leu Ser Leu Asp Thr
145 150 155 160

Leu Asp Arg Asp Gln Leu Ser Pro Gln Tyr Val His Asn Leu Arg Ser
165 170 175

Lys Val Gln Ser Leu His Leu Trp Asn Asn Gly Arg Asn His Leu Ile
180 185 190

Phe Asn Leu Tyr Ser Gly Thr Trp Pro Asp Tyr Thr Glu Asp Val Gly
195 200 205

Phe Asp Ile Gly Gln Ala Met Leu Ala Lys Ala Ser Ile Ser Thr Glu
210 215 220

Asn Phe Arg Pro Asn Phe Asp Val Ser Ile Pro Leu Phe Ser Lys Asp
225 230 235 240

His Pro Arg Thr Gly Gly Glu Arg Gly Phe Leu Lys Phe Asn Thr Ile
245 250 255

Pro Pro Leu Arg Lys Tyr Met Leu Val Phe Lys Gly Lys Arg Tyr Leu
260 265 270

Thr Gly Ile Gly Ser Asp Thr Arg Asn Ala Leu Tyr His Val His Asn
275 280 285

Gly Glu Asp Val Leu Leu Leu Thr Thr Cys Lys His Gly Lys Asp Trp
290 295 300

Gln Lys His Lys Asp Ser Arg Cys Asp Arg Asp Asn Thr Glu Tyr Glu
305 310 315 320

Lys Tyr Asp Tyr Arg Glu Met Leu His Asn Ala Thr Phe Cys Leu Val
325 330 335

Pro Arg Gly Arg Arg Leu Gly Ser Phe Arg Phe Leu Glu Ala Leu Gln
340 345 350

Ala Ala Cys Val Pro Val Met Leu Ser Asn Gly Trp Glu Leu Pro Phe
355 360 365

Ser Glu Val Ile Asn Trp Asn Gln Ala Ala Val Ile Gly Asp Glu Arg
370 375 380

Leu Leu Leu Gln Ile Pro Ser Thr Ile Arg Ser Ile His Gln Asp Lys
385 390 395 400

Ile Leu Ala Leu Arg Gln Gln Thr Gln Phe Leu Trp Glu Ala Tyr Phe
405 410 415

Ser Ser Val Glu Lys Ile Val Leu Thr Thr Leu Glu Ile Ile Gln Asp
420 425 430

Arg Ile Phe Lys His Ile Ser Arg Asn Ser Leu Ile Trp Asn Lys His
435 440 445

Pro Gly Gly Leu Phe Val Leu Pro Gln Tyr Ser Ser Tyr Leu Gly Asp
450 455 460

Phe Pro Tyr Tyr Tyr Ala Asn Leu Gly Leu Lys Pro Pro Ser Lys Phe
465 470 475 480

Thr Ala Val Ile His Ala Val Thr Pro Leu Val Ser Gln Ser Gln Pro
485 490 495

Val Leu Lys Leu Leu Val Ala Ala Ala Lys Ser Gln Tyr Cys Ala Gln
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515 520 525

Trp Pro Ala Thr Ala Val Pro Val Ile Val Ile Glu Gly Glu Ser Lys
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545 550 555 560

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565 570 575

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580 585 590

Pro Ala Arg Ser His Phe Trp Asp Asn Ser Lys Glu Arg Trp Gly Tyr
595 600 605

Thr Ser Lys Trp Thr Asn Asp Tyr Ser Met Val Leu Thr Gly Ala Ala
610 615 620

Ile Tyr His Lys Tyr Tyr His Tyr Leu Tyr Ser His Tyr Leu Pro Ala
625 630 635 640

Ser Leu Lys Asn Met Val Asp Gln Leu Ala Asn Cys Glu Asp Ile Leu
645 650 655

Met Asn Phe Leu Val Ser Ala Val Thr Lys Leu Pro Pro Ile Lys Val
660 665 670

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675 680 685

Ala Ser Arg Trp Ala Asp Pro Asp His Phe Ala Gln Arg Gln Ser Cys
690 695 700

Met Asn Thr Phe Ala Ser Trp Phe Gly Tyr Met Pro Leu Ile His Ser
705 710 715 720

Gln Met Arg Leu Asp Pro Val Leu Phe Lys Asp Gln Val Ser Ile Leu
725 730 735

Arg Lys Lys Tyr Arg Asp Ile Glu Arg Leu
740 745

<210> 66
<211> 718
<212> PRT
<213> Mus musculus

<400> 66

Met Cys Ala Ser Val Lys Ser Asn Ile Arg Gly Pro Ala Leu Ile Pro
1 5 10 15

Arg Met Lys Thr Lys His Arg Ile Tyr Tyr Val Thr Leu Phe Ser Ile
20 25 30

Val Leu Leu Gly Leu Ile Ala Thr Gly Met Phe Gln Phe Trp Pro His
35 40 45

Ser Ile Glu Ser Ser Asp Gly Gly Val Glu Lys Arg Ser Ile Arg
50 55 60

Glu Val Pro Val Val Arg Leu Pro Thr Asp Ser Pro Ile Pro Glu Arg
65 70 75 80

Gly Asp Leu Ser Cys Arg Met His Thr Cys Phe Asp Val Tyr Arg Cys
85 90 95

Gly Phe Asn Pro Lys Asn Lys Ile Lys Val Tyr Ile Tyr Pro Leu Lys
100 105 110

Lys Tyr Val Asp Asp Ala Gly Val Pro Val Ser Ser Ala Ile Ser Arg
115 120 125

Glu Tyr Asn Glu Leu Leu Thr Ala Ile Ser Asp Ser Asp Tyr Tyr Thr
130 135 140

Asp Asp Ile Asn Arg Ala Cys Leu Phe Val Pro Ser Ile Asp Val Leu
145 150 155 160

Asn Gln Asn Pro Leu Arg Ile Lys Glu Thr Ala Gln Ala Leu Ala Gln
165 170 175

Leu Ser Arg Trp Asp Arg Gly Thr Asn His Leu Leu Phe Asn Met Leu
180 185 190

Pro Gly Ala Pro Pro Asp Tyr Asn Thr Ala Leu Asp Val Pro Arg Asp
195 200 205

Arg Ala Leu Leu Ala Gly Gly Gly Phe Ser Thr Trp Thr Tyr Arg Gln
210 215 220

Gly Tyr Asp Val Ser Ile Pro Val Phe Ser Pro Leu Ser Ala Glu Met
225 230 235 240

Ala Leu Pro Glu Lys Ala Pro Gly Pro Arg Arg Tyr Phe Leu Leu Ser
245 250 255

Ser Gln Met Ala Ile His Pro Glu Tyr Arg Glu Glu Leu Glu Ala Leu
260 265 270

Gln Ala Lys His Gln Glu Ser Val Leu Val Leu Asp Lys Cys Thr Asn
275 280 285

Leu Ser Glu Gly Val Leu Ser Val Arg Lys Arg Cys His Gln His Gln
290 295 300

Val Phe Asp Tyr Pro Gln Val Leu Gln Glu Ala Thr Phe Cys Thr Val
305 310 315 320

Leu Arg Arg Ala Arg Leu Gly Gln Ala Val Leu Ser Asp Val Leu Gln
325 330 335

Ala Gly Cys Val Pro Val Val Ile Ala Asp Ser Tyr Ile Leu Pro Phe
340 345 350

Ser Glu Val Leu Asp Trp Lys Lys Ala Ser Val Val Val Pro Glu Glu
355 360 365

Lys Met Ser Asp Val Tyr Ser Ile Leu Gln Asn Ile Pro Gln Arg Gln
370 375 380

Ile Glu Glu Met Gln Arg Gln Ala Arg Trp Phe Trp Glu Ala Tyr Phe
385 390 395 400

Gln Ser Ile Lys Ala Ile Ala Leu Ala Thr Leu Gln Ile Ile Asn Asp
405 410 415

Arg Ile Tyr Pro Tyr Ala Ala Ile Ser Tyr Glu Glu Trp Asn Asp Pro
420 425 430

Pro Ala Val Lys Trp Ala Ser Val Ser Asn Pro Leu Phe Leu Pro Leu
435 440 445

Ile Pro Pro Gln Ser Gln Gly Phe Thr Ala Ile Val Leu Thr Tyr Asp
450 455 460

Arg Val Glu Ser Leu Phe Arg Val Ile Thr Glu Val Ser Lys Val Pro
465 470 475 480

Ser Leu Ser Lys Leu Leu Val Val Trp Asn Asn Gln Asn Lys Asn Pro
485 490 495

Pro Glu Glu Ser Leu Trp Pro Lys Ile Arg Val Pro Leu Lys Val Val
500 505 510

Arg Thr Ala Glu Asn Lys Leu Ser Asn Arg Phe Phe Pro Tyr Asp Glu
515 520 525

Ile Glu Thr Glu Ala Val Leu Ala Ile Asp Asp Asp Ile Ile Met Leu
530 535 540

Thr Ser Asp Glu Leu Gln Phe Gly Tyr Glu Val Trp Arg Glu Phe Pro
545 550 555 560

Asp Arg Leu Val Gly Tyr Pro Gly Arg Leu His Leu Trp Asp His Glu
565 570 575

Met Asn Lys Trp Lys Tyr Glu Ser Glu Trp Thr Asn Glu Val Ser Met
580 585 590

Val Leu Thr Gly Ala Ala Phe Tyr His Lys Tyr Phe Asn Tyr Leu Tyr
595 600 605

Thr Tyr Lys Met Pro Gly Asp Ile Lys Asn Trp Val Asp Ala His Met
610 615 620

Asn Cys Glu Asp Ile Ala Met Asn Phe Leu Val Ala Asn Val Thr Gly
625 630 635 640

Lys Ala Val Ile Lys Val Thr Pro Arg Lys Lys Phe Lys Cys Pro Glu
645 650 655

Cys Thr Ala Ile Asp Gly Leu Ser Leu Asp Gln Thr His Met Val Glu
660 665 670

Arg Ser Glu Cys Ile Asn Lys Phe Ala Ser Val Phe Gly Thr Met Pro
675 680 685

Leu Lys Val Val Glu His Arg Ala Asp Pro Val Leu Tyr Lys Asp Asp
690 695 700

Phe Pro Glu Lys Leu Lys Ser Phe Pro Asn Ile Gly Ser Leu
705 710 715

<210> 67
<211> 76
<212> PRT
<213> Artificial sequence

<220>
<223> motif

<220>
<221> MISC_FEATURE
<222> (4)..(4)
<223> ANY AMINO ACID

<220>
<221> MISC_FEATURE
<222> (6)..(6)
<223> Leu or Ile

<220>
<221> MISC_FEATURE
<222> (8)..(11)
<223> any amino acid

<220>
<221> MISC_FEATURE
<222> (14)..(14)
<223> any amino acid

<220>
<221> MISC_FEATURE
<222> (15)..(15)
<223> Ser or Thr

<220>
<221> MISC_FEATURE
<222> (16)..(16)
<223> Ser or Thr

<220>
<221> MISC_FEATURE
<222> (18)..(18)
<223> Lys or Asn

<220>
<221> MISC_FEATURE
<222> (19)..(19)
<223> Thr or Ser

<220>
<221> MISC_FEATURE
<222> (20)..(25)
<223> any amino acid

<220>
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<222> (28)..(28)
<223> any amino acid

<220>
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<222> (29)..(31)
<223> Ser or Thr

<220>
<221> MISC_FEATURE
<222> (32)..(32)
<223> Lys or Arg

<220>
<221> MISC_FEATURE
<222> (34)..(34)
<223> Lys or Arg

<220>
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<222> (35)..(40)
<223> any amino acid

<220>
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<222> (42)..(42)
<223> any amino acid

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<223> any amino acid

<220>
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<222> (46)..(61)
<223> any amino acid

<220>
<221> MISC_FEATURE
<222> (65)..(65)
<223> any amino acid

<220>
<221> MISC_FEATURE
<222> (68)..(68)
<223> any amino acid

<220>
<221> MISC_FEATURE
<222> (69)..(69)
<223> Cys or Ser

<220>
<221> MISC_FEATURE
<222> (71)..(71)
<223> His or Pro

<220>
<221> MISC_FEATURE
<222> (75)..(75)
<223> any amino acid

<400> 67

Gln Thr Tyr Xaa Asn Xaa Glu Xaa Xaa Xaa Xaa Asp Asp Xaa Xaa Xaa
1 5 10 15

Asp Xaa Xaa Xaa Xaa Xaa Xaa Ile Ala Xaa Xaa Xaa Xaa Xaa
20 25 30

Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Xaa Gly Xaa Tyr Xaa Xaa Xaa
35 40 45

Xaa Phe Gln Asp
50 55 60

Xaa Asp Asp Xaa Xaa His Xaa Glu Arg Ile Xaa Arg
65 70 75

<210> 68
<211> 102
<212> PRT
<213> Artificial Sequence

<220>
<223> motif

<220>
<221> MISC_FEATURE
<222> (1)..(1)
<223> Lys or Arg

<220>
<221> MISC_FEATURE
<222> (3)..(3)
<223> any amino acid

<220>
<221> MISC_FEATURE
<222> (8)..(19)
<223> each position may be any amino acid

<220>
<221> MISC_FEATURE
<222> (20)..(24)
<223> may be missing from sequence; each position may be any amino acid

<220>
<221> MISC_FEATURE
<222> (20)..(24)
<223> all or part of sequence comprising residues 20-24 may be missing;
each position may be any amino acid

<220>
<221> MISC_FEATURE
<222> (29)..(29)
<223> Arg or Ile

<220>
<221> MISC_FEATURE
<222> (32)..(32)
<223> any amino acid

<220>
<221> MISC_FEATURE
<222> (35)..(37)
<223> any amino acid

<220>
<221> MISC_FEATURE
<222> (39)..(84)
<223> each position may be any amino acid

<220>
<221> MISC_FEATURE
<222> (85)..(94)
<223> all or part of sequence comprising residues 85-94 may be missing;
each position may be any amino acid

<220>
<221> MISC_FEATURE
<222> (96)..(96)
<223> any amino acid

<400> 68

Xaa Asp Xaa Gly Lys Phe Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
1 5 10 15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asp Asp Asp Asp Ile Xaa Tyr Pro Xaa
20 25 30

Asp Tyr Xaa Xaa Xaa Met Xaa
35 40 45

Xaa
50 55 60

Xaa
65 70 75 80

Xaa Val Asn Xaa
85 90 95

Leu Gly Thr Gly Thr Val
100

<210> 69
<211> 1854
<212> DNA
<213> *Pasteurella multocida*

<400> 69
atgagcttat tttaaacgtgc tactgagcta tttaagtcag gaaactataa agatgcacta 60
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gatatatgtt aaaaaatata aacacaatca aaaagtaata aaatagaaga agataatatt 180
tctggagaaa acaaattttc agtataataa aaagatctat ataacgaaat aagcaatagt 240
gaatttaggaa ttacaaaaga aagacttagga gccccccctc tagtcagttataatgact 300
tctcataata cagaaaaattt cattgaagcc tcaattaatt cactattttt gcaaacatac 360

aataacttag aagttatcg	tgttagatgat tatagcacag ataaaacatt tcagatcgca	420
tccagaatag caaactctac	aagtaaagta aaaacattcc gattaaactc aaatctaggg	480
acatacttg cgaaaaatac	aggaatttt aagtctaaag gagatattat tttctttcag	540
gatagcgatg atgtatgtca	ccatgaaaga atcgaaagat gtgttaatgc attattatcg	600
aataaagata atatagctgt	tagatgtgca tattctagaa taaatctaga aacacaaaat	660
ataataaaaag ttaatgataa	taaatacaaa ttaggattaa taactttagg cgttataga	720
aaagtattta atgaaattgg	tttttttaac tgcacaacca aagcatcgga tcatgtattt	780
tatcatagaa taattaaata	ctatggtaaa aataggataa ataacttatt tctaccactg	840
tattataaca caatgcgtga	agattcatta ttttctgata tggttgagtg ggtagatgaa	900
aataatataa agcaaaaaac	ctctgatgct agacaaaatt atctccatga attccaaaaa	960
atacacaatg aaagggaaatt	aatgaatta aaagagattt ttagcttcc tagaattcat	1020
gacgccttac ctatataaaa	agaaatgagt aagctcagca accctaaaat tcctgtttat	1080
ataaaatataat gctcaatacc	ttcaagaata aaacaacttc aatacactat tggagtacta	1140
aaaaaccaat gcgatcattt	tcataatttat cttgatggat atccagaagt acctgatttt	1200
ataaaaaaaac taggaaataa	agcgaccgtt attaattgtc aaaacaaaaa tgagtctatt	1260
agagataatg gaaagtttat	tctatttagaa aaacttataa aggaaaataa agatggatat	1320
tatataaactt gtgatgatga	tatccggat cctgctgact acataaacac tatgataaaa	1380
aaaattaata aatacaatga	taaaggcagca attggattac atgggtttat attcccaagt	1440
agagtcaaca agtattttc	atcagacaga attgtctata atttcaaaa acctttgaa	1500
aatgataactg ctgtaaatat	attaggaact ggaactgttg ccttttagagt atctatttt	1560
aataaaatttt ctctatctga	tttgagcat cctggcatgg tagatatcta tttttctata	1620
ctatgtaaaaaaat actccaagtt	tgtatatcac gaccatcgaa ttggctaaca	1680
gaagataaca aaaacactga	gaccttattt catgaattcc aaaatagaga taaaatacaa	1740
agtaaactca ttatttcaaa	caacccttgg ggatactcaa gtatatatcc attattaaat	1800
aataatgcta attattctga	acttattccg tgtttatctt tttataacga gtaa	1854

<210> 70

<211> 617

<212> PRT

<213> *Pasteurella multocida*

<400> 70

Met Ser Leu Phe Lys Arg Ala Thr Glu Leu Phe Lys Ser Gly Asn Tyr
 1 5 10 15

Lys Asp Ala Leu Thr Leu Tyr Glu Asn Ile Ala Lys Ile Tyr Gly Ser
 20 25 30

Glu Ser Leu Val Lys Tyr Asn Ile Asp Ile Cys Lys Lys Asn Ile Thr
35 40 45

Gln Ser Lys Ser Asn Lys Ile Glu Glu Asp Asn Ile Ser Gly Glu Asn
50 55 60

Lys Phe Ser Val Ser Ile Lys Asp Leu Tyr Asn Glu Ile Ser Asn Ser
65 70 75 80

Glu Leu Gly Ile Thr Lys Glu Arg Leu Gly Ala Pro Pro Leu Val Ser
85 90 95

Ile Ile Met Thr Ser His Asn Thr Glu Lys Phe Ile Glu Ala Ser Ile
100 105 110

Asn Ser Leu Leu Leu Gln Thr Tyr Asn Asn Leu Glu Val Ile Val Val
115 120 125

Asp Asp Tyr Ser Thr Asp Lys Thr Phe Gln Ile Ala Ser Arg Ile Ala
130 135 140

Asn Ser Thr Ser Lys Val Lys Thr Phe Arg Leu Asn Ser Asn Leu Gly
145 150 155 160

Thr Tyr Phe Ala Lys Asn Thr Gly Ile Leu Lys Ser Lys Gly Asp Ile
165 170 175

Ile Phe Phe Gln Asp Ser Asp Asp Val Cys His His Glu Arg Ile Glu
180 185 190

Arg Cys Val Asn Ala Leu Leu Ser Asn Lys Asp Asn Ile Ala Val Arg
195 200 205

Cys Ala Tyr Ser Arg Ile Asn Leu Glu Thr Gln Asn Ile Ile Lys Val
210 215 220

Asn Asp Asn Lys Tyr Lys Leu Gly Leu Ile Thr Leu Gly Val Tyr Arg
225 230 235 240

Lys Val Phe Asn Glu Ile Gly Phe Phe Asn Cys Thr Thr Lys Ala Ser
245 250 255

Asp Asp Glu Phe Tyr His Arg Ile Ile Lys Tyr Tyr Gly Lys Asn Arg
260 265 270

Ile Asn Asn Leu Phe Leu Pro Leu Tyr Tyr Asn Thr Met Arg Glu Asp
275 280 285

Ser Leu Phe Ser Asp Met Val Glu Trp Val Asp Glu Asn Asn Ile Lys
290 295 300

Gln Lys Thr Ser Asp Ala Arg Gln Asn Tyr Leu His Glu Phe Gln Lys
305 310 315 320

Ile His Asn Glu Arg Lys Leu Asn Glu Leu Lys Glu Ile Phe Ser Phe
325 330 335

Pro Arg Ile His Asp Ala Leu Pro Ile Ser Lys Glu Met Ser Lys Leu
340 345 350

Ser Asn Pro Lys Ile Pro Val Tyr Ile Asn Ile Cys Ser Ile Pro Ser
355 360 365

Arg Ile Lys Gln Leu Gln Tyr Thr Ile Gly Val Leu Lys Asn Gln Cys
370 375 380

Asp His Phe His Ile Tyr Leu Asp Gly Tyr Pro Glu Val Pro Asp Phe
385 390 395 400

Ile Lys Lys Leu Gly Asn Lys Ala Thr Val Ile Asn Cys Gln Asn Lys
405 410 415

Asn Glu Ser Ile Arg Asp Asn Gly Lys Phe Ile Leu Leu Glu Lys Leu
420 425 430

Ile Lys Glu Asn Lys Asp Gly Tyr Tyr Ile Thr Cys Asp Asp Asp Ile
435 440 445

Arg Tyr Pro Ala Asp Tyr Ile Asn Thr Met Ile Lys Lys Ile Asn Lys
450 455 460

Tyr Asn Asp Lys Ala Ala Ile Gly Leu His Gly Val Ile Phe Pro Ser
465 470 475 480

Arg Val Asn Lys Tyr Phe Ser Ser Asp Arg Ile Val Tyr Asn Phe Gln
485 490 495

Lys Pro Leu Glu Asn Asp Thr Ala Val Asn Ile Leu Gly Thr Gly Thr
500 505 510

Val Ala Phe Arg Val Ser Ile Phe Asn Lys Phe Ser Leu Ser Asp Phe
515 520 525

Glu His Pro Gly Met Val Asp Ile Tyr Phe Ser Ile Leu Cys Lys Lys
530 535 540

Asn Asn Ile Leu Gln Val Cys Ile Ser Arg Pro Ser Asn Trp Leu Thr
545 550 555 560

Glu Asp Asn Lys Asn Thr Glu Thr Leu Phe His Glu Phe Gln Asn Arg
565 570 575

Asp Glu Ile Gln Ser Lys Leu Ile Ile Ser Asn Asn Pro Trp Gly Tyr
580 585 590

Ser Ser Ile Tyr Pro Leu Leu Asn Asn Asn Ala Asn Tyr Ser Glu Leu
595 600 605

Ile Pro Cys Leu Ser Phe Tyr Asn Glu
610 615

<210> 71
<211> 2112
<212> DNA
<213> Pasteurella multocida

<400> 71
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aaattatttg aaaagtccggc ggaaatctat ggacggaaaa ttgttgaatt tcaaattacc 120
aaatgcaaag aaaaactctc agcacatcct tctgttaatt cagcacatct ttctgtaaat 180
aaagaagaaa aagtcaatgt ttgcgatagt ccgttagata ttgcaacaca actgttactt 240
tccaacgtaa aaaaattagt actttctgac tcggaaaaaa acacgttaaa aaataaatgg 300
aaattgctca ctgagaagaa atctgaaaat gcggaggtaa gagcggtcgc ccttgtacca 360
aaagattttc ccaaagatct gtttttagcg ccttacctg atcatgttaa tgattttaca 420
tggtacaaaa agcgaagaaa aagacttggc ataaaacctg aacatcaaca tgggtgtctt 480
tctattatcg ttacaacatt caatcgacca gcaattttat cgattacatt agcctgttta 540
gtaaacccaaa aaacacatta cccgtttgaa gttatcgtga cagatgatgg tagtcaggaa 600
gatctatcac cgatcattcg ccaatatgaa aataaattgg atattcgcta cgtcagacaa 660
aaagataacg gttttcaagc cagtgccgct cggaaatatgg gattacgctt agcaaaatat 720
gactttatttgc gcttactcg ctgtgatatg gcgc当地atc cattatgggt tcattttat 780
gttgcagagc tattagaaga tgatgattt acaatcattt gtc当地agaaa atacatcgat 840
acacaacata ttgacccaaa agacttctt aataacgc当地 gtttgc当地ta atcattacca 900
gaagtgaaaa ccaataatag tttgc当地ca aaagggaaag gaacagttt cttggattgg 960
cgcttagaac aattcgaaaa aacagaaaaat ctccgcttccgattcgcc tttccgaaaa 1020
tttgc当地gg gtaatgttgc tttcgctaaa aatggctaa ataaatccgg tttctttgat 1080

gaggaattta atcactgggg tggagaagat gtggaaatttgc atatcgctt attccgttac	1140
ggtagttctt ttaaaaactat tgatggcatt atggcctacc atcaagagcc accaggtaaa	1200
gaaaatgaaa ccgatcgtga agcgggaaaa aatattacgc tcgatattat gagagaaaag	1260
gtcccttata tctatagaaa acttttacca atagaagatt cgcatatcaa tagatcacct	1320
ttagttcaa tttatatccc agcttataac tgtcaaact atattcaacg ttgcgtagat	1380
agtgcactga atcagactgt tggtgatctc gaggtttgtat tttgtaacga tggtaaca	1440
gataataacct tagaagtgtat caataagctt tatgtaata atccttaggtt acgcacat	1500
tctaaaccaa atggcgaat agcctcagca tcaaattgcag ccgtttcttt tgctaaaggt	1560
tattacatttggcagttttaga ttcagatgtat tatcttgagc ctgatgcagt tgaactgtgt	1620
ttaaaaagaat tttaaaaga taaaacgcta gcttgcgtttt ataccactaa tagaaacgtc	1680
aatccggatg gtagcttaat cgctaatggc tacaattggc cagaattttc acgagaaaaaa	1740
ctcacaacgg ctatgattgc tcaccactt agaatgtca cgattagagc ttggcattta	1800
actgatggat tcaatgaaaaaattgaaaat gccgtagact atgacatgtt cctcaaactc	1860
agtgaagttt gaaaattttaa acatcttaat aaaatctgct ataaccgtgtt attacatgg	1920
gataacacat caattaagaa acttggcatt caaaagaaaaa accattttgt ttagtcaat	1980
cagtcattaa atagacaagg cataacttat tataattatg acgaatttga tgattttagat	2040
gaaagtagaa agtataatttt caataaaacc gctgaatatc aagaagagat tgatatctta	2100
aaagatattt aa	2112

<210> 72

<211> 107

<212> PRT

<213> Pasteurella multocida

<400> 72

Ser Ile Ile Val Thr Thr Phe Asn Arg Pro Ala Ile Leu Ser Ile Thr
 1 5 10 15

Leu Ala Cys Leu Val Asn Gln Lys Thr His Tyr Pro Phe Glu Val Ile
 20 25 30

Val Thr Asp Asp Gly Ser Gln Glu Asp Leu Ser Pro Ile Ile Arg Gln
 35 40 45

Tyr Glu Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Asn Gly
 50 55 60

Phe Gln Ala Ser Ala Ala Arg Asn Met Gly Leu Arg Leu Ala Lys Tyr
 65 70 75 80

Asp Phe Ile Gly Leu Leu Asp Cys Asp Met Ala Pro Asn Pro Leu Trp
85 90 95

Val His Ser Tyr Val Ala Glu Leu Leu Glu Asp
100 105

<210> 73
<211> 105
<212> PRT
<213> *Pasteurella multocida*

<400> 73

Ser Ile Tyr Ile Pro Ala Tyr Asn Cys Ala Asn Tyr Ile Gln Arg Cys
1 5 10 15

Val Asp Ser Ala Leu Asn Gln Thr Thr Val Asp Leu Glu Val Cys Ile
20 25 30

Cys Asn Asp Gly Ser Thr Asp Asn Thr Leu Glu Val Ile Asn Lys Leu
35 40 45

Tyr Gly Asn Asn Pro Arg Val Arg Ile Met Ser Lys Pro Asn Gly Gly
50 55 60

Ile Ala Ser Ala Ser Asn Ala Ala Val Ser Phe Ala Lys Gly Tyr Tyr
65 70 75 80

Ile Gly Gln Leu Asp Ser Asp Asp Tyr Leu Glu Pro Asp Ala Val Glu
85 90 95

Leu Cys Leu Lys Glu Phe Leu Lys Asp
100 105

<210> 74
<211> 771
<212> PRT
<213> *Pasteurella multocida*

<400> 74

Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Ser Asn Asp Tyr
1 5 10 15

Gln Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Ile Tyr Gly Arg
20 25 30

Lys Ile Val Glu Phe Gln Ile Thr Lys Cys Lys Glu Lys Leu Ser Ala
35 40 45

His Pro Ser Val Asn Ser Ala His Leu Ser Val Asn Lys Glu Glu Lys
50 55 60

Val Asn Val Cys Asp Ser Pro Leu Asp Ile Ala Thr Gln Leu Leu Leu
65 70 75 80

Ser Asn Val Lys Lys Leu Val Leu Ser Asp Ser Glu Lys Asn Thr Leu
85 90 95

Lys Asn Lys Trp Lys Leu Leu Thr Glu Lys Lys Ser Glu Asn Ala Glu
100 105 110

Val Arg Ala Val Ala Leu Val Pro Lys Asp Phe Pro Lys Asp Leu Val
115 120 125

Leu Ala Pro Leu Pro Asp His Val Asn Asp Phe Thr Trp Tyr Lys Lys
130 135 140

Arg Lys Lys Arg Leu Gly Ile Lys Pro Glu His Gln His Val Gly Leu
145 150 155 160

Ser Ile Ile Val Thr Thr Phe Asn Arg Pro Ala Ile Leu Ser Ile Thr
165 170 175

Leu Ala Cys Leu Val Asn Gln Lys Thr His Tyr Pro Phe Glu Val Ile
180 185 190

Val Thr Asp Asp Gly Ser Gln Glu Asp Leu Ser Pro Ile Ile Arg Gln
195 200 205

Tyr Glu Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Asn Gly
210 215 220

Phe Gln Ala Ser Ala Ala Arg Asn Met Gly Leu Arg Leu Ala Lys Tyr
225 230 235 240

Asp Phe Ile Gly Leu Leu Asp Cys Asp Met Ala Pro Asn Pro Leu Trp
245 250 255

Val His Ser Tyr Val Ala Glu Leu Leu Val Gln Lys Tyr Glu Gln Lys
260 265 270

Leu Asp Ile Lys Tyr Val Arg Gln Lys Asp Tyr Gly Tyr Gln Leu Cys
275 280 285

Ala Val Arg Asn Leu Gly Leu Arg Thr Ala Lys Tyr Asp Phe Val Ser
290 295 300

Ile Leu Asp Cys Asp Met Ala Pro Gln Gln Leu Trp Val His Ser Tyr
305 310 315 320

Leu Thr Glu Leu Leu Glu Asp Asn Asp Ile Val Leu Ile Gly Pro Arg
325 330 335

Lys Tyr Val Asp Thr His Asn Ile Thr Ala Glu Gln Phe Leu Asn Asp
340 345 350

Pro Tyr Leu Ile Glu Ser Leu Pro Glu Thr Ala Thr Asn Asn Asn Pro
355 360 365

Ser Ile Thr Ser Lys Gly Asn Ile Ser Leu Asp Trp Arg Leu Glu His
370 375 380

Phe Lys Lys Thr Asp Asn Leu Arg Leu Cys Asp Ser Pro Phe Arg Tyr
385 390 395 400

Phe Ser Cys Gly Asn Val Ala Phe Ser Lys Glu Trp Leu Asn Lys Val
405 410 415

Gly Trp Phe Asp Glu Glu Phe Asn His Trp Gly Gly Glu Asp Val Glu
420 425 430

Phe Gly Tyr Arg Leu Phe Ala Lys Gly Cys Phe Phe Arg Val Ile Asp
435 440 445

Gly Gly Met Ala Tyr His Gln Glu Pro Pro Gly Lys Glu Asn Glu Thr
450 455 460

Asp Arg Glu Ala Gly Lys Ser Ile Thr Leu Lys Ile Val Lys Glu Lys
465 470 475 480

Val Pro Tyr Ile Tyr Arg Lys Leu Leu Pro Ile Glu Asp Ser His Ile
485 490 495

His Arg Ile Pro Leu Val Ser Ile Tyr Ile Pro Ala Tyr Asn Cys Ala
500 505 510

Asn Tyr Ile Gln Arg Cys Val Asp Ser Ala Leu Asn Gln Thr Val Val
515 520 525

Asp Leu Glu Val Cys Ile Cys Asn Asp Gly Ser Thr Asp Asn Thr Leu
530 535 540

Glu Val Ile Asn Lys Leu Tyr Gly Asn Asn Pro Arg Val Arg Ile Met
545 550 555 560

Ser Lys Pro Asn Gly Gly Ile Ala Ser Ala Ser Asn Ala Ala Val Ser
565 570 575

Phe Ala Lys Gly Tyr Tyr Ile Gly Gln Leu Asp Ser Asp Asp Tyr Leu
580 585 590

Glu Pro Asp Ala Val Glu Leu Cys Leu Lys Glu Phe Leu Lys Asp Lys
595 600 605

Thr Leu Ala Cys Val Tyr Thr Thr Asn Arg Asn Val Asn Pro Asp Gly
610 615 620

Ser Leu Ile Ala Asn Gly Tyr Asn Trp Pro Glu Phe Ser Arg Glu Lys
625 630 635 640

Leu Thr Thr Ala Met Ile Ala His His Phe Arg Met Phe Thr Ile Arg
645 650 655

Ala Trp His Leu Thr Asp Gly Phe Asn Glu Asn Ile Glu Asn Ala Val
660 665 670

Asp Tyr Asp Met Phe Leu Lys Leu Ser Glu Val Gly Lys Phe Lys His
675 680 685

Leu Asn Lys Ile Cys Tyr Asn Arg Val Leu His Gly Asp Asn Thr Ser
690 695 700

Ile Lys Lys Leu Gly Ile Gln Lys Lys Asn His Phe Val Val Val Asn
705 710 715 720

Gln Ser Leu Asn Arg Gln Gly Ile Asn Tyr Tyr Asn Tyr Asp Lys Phe
725 730 735

Asp Asp Leu Asp Glu Ser Arg Lys Tyr Ile Phe Asn Lys Thr Ala Glu
740 745 750

Tyr Gln Glu Glu Met Asp Ile Leu Lys Asp Leu Lys Leu Ile Gln Asn
755 760 765

Lys Asp Ala
770

<210> 75
<211> 696
<212> PRT
<213> *Pasteurella multocida*

<400> 75

Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Ser Asn Asp Tyr
1 5 10 15

Glu Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Thr Tyr Gly Arg
20 25 30

Lys Ile Val Glu Phe Gln Ile Ile Lys Cys Lys Glu Lys Leu Ser Thr
35 40 45

Asn Ser Tyr Val Ser Glu Asp Lys Lys Asn Ser Val Cys Asp Ser Ser
50 55 60

Leu Asp Ile Ala Thr Gln Leu Leu Ser Asn Val Lys Lys Leu Thr
65 70 75 80

Leu Ser Glu Ser Glu Lys Asn Ser Leu Lys Asn Lys Trp Lys Ser Ile
85 90 95

Thr Gly Lys Lys Ser Glu Asn Ala Glu Ile Arg Lys Val Glu Leu Val
100 105 110

Pro Lys Asp Phe Pro Lys Asp Leu Val Leu Ala Pro Leu Pro Asp His
115 120 125

Val Asn Asp Phe Thr Trp Tyr Lys Asn Arg Lys Lys Ser Leu Gly Ile
130 135 140

Lys Pro Val Asn Lys Asn Ile Gly Leu Ser Ile Ile Ile Pro Thr Phe
145 150 155 160

Asn Arg Ser Arg Ile Leu Asp Ile Thr Leu Ala Cys Leu Val Asn Gln
165 170 175

Lys Thr Asn Tyr Pro Phe Glu Val Val Val Ala Asp Asp Gly Ser Lys
180 185 190

Glu Asn Leu Leu Thr Ile Ile Arg Gln Tyr Glu Asn Lys Leu Asp Ile
195 200 205

Arg Tyr Val Arg Gln Lys Asp Asn Gly Phe Gln Ala Ser Ala Ala Arg
210 215 220

Asn Met Gly Leu Arg Leu Ala Lys Tyr Asp Phe Ile Gly Leu Leu Asp
225 230 235 240

Cys Asp Met Ala Pro Asn Pro Leu Trp Val His Ser Tyr Val Ala Glu
245 250 255

Leu Leu Glu Asp Asp Asp Leu Thr Ile Ile Gly Pro Arg Lys Tyr Ile
260 265 270

Asp Thr Gln His Ile Asp Pro Lys Asp Phe Leu Asn Asn Ala Ser Leu
275 280 285

Leu Glu Ser Leu Pro Glu Val Lys Thr Asn Asn Ser Val Ala Ala Lys
290 295 300

Gly Glu Gly Thr Val Ser Leu Asp Trp Arg Leu Glu Gln Phe Glu Lys
305 310 315 320

Thr Glu Asn Leu Arg Leu Ser Asp Ser Pro Phe Arg Phe Phe Ala Ala
325 330 335

Gly Asn Val Ala Phe Ala Lys Lys Trp Leu Asn Lys Ser Gly Phe Phe
340 345 350

Asp Glu Glu Phe Asn His Trp Gly Gly Glu Asp Val Glu Phe Gly Tyr
355 360 365

Arg Leu Phe Arg Tyr Gly Ser Phe Phe Lys Thr Ile Asp Gly Ile Met
370 375 380

Ala Tyr His Gln Glu Pro Pro Gly Lys Glu Asn Glu Thr Asp Arg Glu
385 390 395 400

Ala Gly Lys Asn Ile Thr Leu Asp Ile Met Arg Glu Lys Val Pro Tyr
405 410 415

Ile Tyr Arg Lys Leu Leu Pro Ile Glu Asp Ser His Ile Asn Arg Val
420 425 430

Pro Leu Val Ser Ile Tyr Ile Pro Ala Tyr Asn Cys Ala Asn Tyr Ile
435 440 445

Gln Arg Cys Val Asp Ser Ala Leu Asn Gln Thr Val Val Asp Leu Glu
450 455 460

Val Cys Ile Cys Asn Asp Gly Ser Thr Asp Asn Thr Leu Glu Val Ile
465 470 475 480

Asn Lys Leu Tyr Gly Asn Asn Pro Arg Val Arg Ile Met Ser Lys Pro
485 490 495

Asn Gly Gly Ile Ala Ser Ala Ser Asn Ala Ala Val Ser Phe Ala Lys
500 505 510

Gly Tyr Tyr Ile Gly Gln Leu Asp Ser Asp Asp Tyr Leu Glu Pro Asp
515 520 525

Ala Val Glu Leu Cys Leu Lys Glu Phe Leu Lys Asp Lys Thr Leu Ala
530 535 540

Cys Val Tyr Thr Thr Asn Arg Asn Val Asn Pro Asp Gly Ser Leu Ile
545 550 555 560

Ala Asn Gly Tyr Asn Trp Pro Glu Phe Ser Arg Glu Lys Leu Thr Thr
565 570 575

Ala Met Ile Ala His His Phe Arg Met Phe Thr Ile Arg Ala Trp His
580 585 590

Leu Thr Asp Gly Phe Asn Glu Lys Ile Glu Asn Ala Val Asp Tyr Asp
595 600 605

Met Phe Leu Lys Leu Ser Glu Val Gly Lys Phe Lys His Leu Asn Lys
610 615 620

Ile Cys Tyr Asn Arg Val Leu His Gly Asp Asn Thr Ser Ile Lys Lys
625 630 635 640

Leu Gly Ile Gln Lys Lys Asn His Phe Val Val Val Asn Gln Ser Leu
645 650 655

Asn Arg Gln Gly Ile Thr Tyr Tyr Asn Tyr Asp Glu Phe Asp Asp Leu
660 665 670

Asp Glu Ser Arg Lys Tyr Ile Phe Asn Lys Thr Ala Glu Tyr Gln Glu
675 680 685

Glu Ile Asp Ile Leu Lys Asp Ile
690 695

<210> 76
<211> 711
<212> PRT
<213> *Pasteurella multocida*

<400> 76

Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Ser Asn Asp Tyr
1 5 10 15

Gln Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Ile Tyr Gly Arg
20 25 30

Lys Ile Val Glu Phe Gln Ile Thr Lys Cys Lys Glu Lys Leu Ser Ala
35 40 45

His Pro Ser Val Asn Ser Ala His Leu Ser Val Asn Lys Glu Glu Lys
50 55 60

Val Asn Val Cys Asp Ser Pro Leu Asp Ile Ala Thr Gln Leu Leu Leu
65 70 75 80

Ser Asn Val Lys Lys Leu Val Leu Ser Asp Ser Glu Lys Asn Thr Leu
85 90 95

Lys Asn Lys Trp Lys Leu Leu Thr Glu Lys Lys Ser Glu Asn Ala Glu
100 105 110

Val Arg Ala Val Ala Leu Val Pro Lys Asp Phe Pro Lys Asp Leu Val
115 120 125

Leu Ala Pro Leu Pro Asp His Val Asn Asp Phe Thr Trp Tyr Lys Lys
130 135 140

Arg Lys Lys Arg Leu Gly Ile Lys Pro Glu His Gln His Val Gly Leu
145 150 155 160

Ser Ile Ile Val Thr Thr Phe Asn Arg Pro Ala Ile Leu Ser Ile Thr
165 170 175

Leu Ala Cys Leu Val Asn Gln Lys Thr His Tyr Pro Phe Glu Val Ile
180 185 190

Val Thr Asp Asp Gly Ser Gln Glu Asp Leu Ser Pro Ile Ile Arg Gln
195 200 205

Tyr Glu Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Tyr Gly
210 215 220

Tyr Gln Leu Cys Ala Val Arg Asn Leu Gly Leu Arg Thr Ala Lys Tyr
225 230 235 240

Asp Phe Val Ser Ile Leu Asp Cys Asp Met Ala Pro Gln Gln Leu Trp
245 250 255

Val His Ser Tyr Leu Thr Glu Leu Leu Glu Asp Asn Asp Ile Val Leu
260 265 270

Ile Gly Pro Arg Lys Tyr Val Asp Thr His Asn Ile Thr Ala Glu Gln
275 280 285

Phe Leu Asn Asp Pro Tyr Leu Ile Glu Ser Leu Pro Glu Thr Ala Thr
290 295 300

Asn Asn Asn Pro Ser Ile Thr Ser Lys Gly Asn Ile Ser Leu Asp Trp
305 310 315 320

Arg Leu Glu His Phe Lys Lys Thr Asp Asn Leu Arg Leu Cys Asp Ser
325 330 335

Pro Phe Arg Tyr Phe Ser Cys Gly Asn Val Ala Phe Ser Lys Glu Trp
340 345 350

Leu Asn Lys Val Gly Trp Phe Asp Glu Glu Phe Asn His Trp Gly Gly
355 360 365

Glu Asp Val Glu Phe Gly Tyr Arg Leu Phe Ala Lys Gly Cys Phe Phe
370 375 380

Arg Val Ile Asp Gly Gly Met Ala Tyr His Gln Glu Pro Pro Gly Lys
385 390 395 400

Glu Asn Glu Thr Asp Arg Glu Ala Gly Lys Ser Ile Thr Leu Lys Ile
405 410 415

Val Lys Glu Lys Val Pro Tyr Ile Tyr Arg Lys Leu Leu Pro Ile Glu
420 425 430

Asp Ser His Ile His Arg Ile Pro Leu Val Ser Ile Tyr Ile Pro Ala
435 440 445

Tyr Asn Cys Ala Asn Tyr Ile Gln Arg Cys Val Asp Ser Ala Leu Asn
450 455 460

Gln Thr Val Val Asp Leu Glu Val Cys Ile Cys Asn Asp Gly Ser Thr
465 470 475 480

Asp Asn Thr Leu Glu Val Ile Asn Lys Leu Tyr Gly Asn Asn Pro Arg
485 490 495

Val Arg Ile Met Ser Lys Pro Asn Gly Gly Ile Ala Ser Ala Ser Asn
500 505 510

Ala Ala Val Ser Phe Ala Lys Gly Tyr Tyr Ile Gly Gln Leu Asp Ser
515 520 525

Asp Asp Tyr Leu Glu Pro Asp Ala Val Glu Leu Cys Leu Lys Glu Phe
530 535 540

Leu Lys Asp Lys Thr Leu Ala Cys Val Tyr Thr Thr Asn Arg Asn Val
545 550 555 560

Asn Pro Asp Gly Ser Leu Ile Ala Asn Gly Tyr Asn Trp Pro Glu Phe
565 570 575

Ser Arg Glu Lys Leu Thr Thr Ala Met Ile Ala His His Phe Arg Met
580 585 590

Phe Thr Ile Arg Ala Trp His Leu Thr Asp Gly Phe Asn Glu Asn Ile
595 600 605

Glu Asn Ala Val Asp Tyr Asp Met Phe Leu Lys Leu Ser Glu Val Gly
610 615 620

Lys Phe Lys His Leu Asn Lys Ile Cys Tyr Asn Arg Val Leu His Gly
625 630 635 640

Asp Asn Thr Ser Ile Lys Lys Leu Gly Ile Gln Lys Lys Asn His Phe
645 650 655

Val Val Val Asn Gln Ser Leu Asn Arg Gln Gly Ile Asn Tyr Tyr Asn
660 665 670

Tyr Asp Lys Phe Asp Asp Leu Asp Glu Ser Arg Lys Tyr Ile Phe Asn
675 680 685

Lys Thr Ala Glu Tyr Gln Glu Glu Met Asp Ile Leu Lys Asp Leu Lys
690 695 700

Leu Ile Gln Asn Lys Asp Ala
705 710

<210> 77
<211> 696
<212> PRT
<213> *Pasteurella multocida*

<400> 77

Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Ser Asn Asp Tyr
1 5 10 15

Glu Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Thr Tyr Gly Arg
20 25 30

Lys Ile Val Glu Phe Gln Ile Ile Lys Cys Lys Glu Lys Leu Ser Thr
35 40 45

Asn Ser Tyr Val Ser Glu Asp Lys Lys Asn Ser Val Cys Asp Ser Ser
50 55 60

Leu Asp Ile Ala Thr Gln Leu Leu Ser Asn Val Lys Lys Leu Thr
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65

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75

80

Leu Ser Glu Ser Glu Lys Asn Ser Leu Lys Asn Lys Trp Lys Ser Ile
85 90 95

Thr Gly Lys Lys Ser Glu Asn Ala Glu Ile Arg Lys Val Glu Leu Val
100 105 110

Pro Lys Asp Phe Pro Lys Asp Leu Val Leu Ala Pro Leu Pro Asp His
115 120 125

Val Asn Asp Phe Thr Trp Tyr Lys Asn Arg Lys Lys Ser Leu Gly Ile
130 135 140

Lys Pro Val Asn Lys Asn Ile Gly Leu Ser Ile Ile Ile Pro Thr Phe
145 150 155 160

Asn Arg Ser Arg Ile Leu Asp Ile Thr Leu Ala Cys Leu Val Asn Gln
165 170 175

Lys Thr Asn Tyr Pro Phe Glu Val Val Val Ala Asp Asp Gly Ser Lys
180 185 190

Glu Asn Leu Leu Thr Ile Val Gln Lys Tyr Glu Gln Lys Leu Asp Ile
195 200 205

Lys Tyr Val Arg Gln Lys Asp Asn Gly Phe Gln Ala Ser Ala Ala Arg
210 215 220

Asn Met Gly Leu Arg Leu Ala Lys Tyr Asp Phe Ile Gly Leu Leu Asp
225 230 235 240

Cys Asp Met Ala Pro Asn Pro Leu Trp Val His Ser Tyr Val Ala Glu
245 250 255

Leu Leu Glu Asp Asp Asp Leu Thr Ile Ile Gly Pro Arg Lys Tyr Ile
260 265 270

Asp Thr Gln His Ile Asp Pro Lys Asp Phe Leu Asn Asn Ala Ser Leu
275 280 285

Leu Glu Ser Leu Pro Glu Val Lys Thr Asn Asn Ser Val Ala Ala Lys
290 295 300

Gly Glu Gly Thr Val Ser Leu Asp Trp Arg Leu Glu Gln Phe Glu Lys
305 310 315 320

Thr Glu Asn Leu Arg Leu Ser Asp Ser Pro Phe Arg Phe Phe Ala Ala
Page 104

325

330

335

Gly Asn Val Ala Phe Ala Lys Lys Trp Leu Asn Lys Ser Gly Phe Phe
340 345 350

Asp Glu Glu Phe Asn His Trp Gly Gly Glu Asp Val Glu Phe Gly Tyr
355 360 365

Arg Leu Phe Arg Tyr Gly Ser Phe Phe Lys Thr Ile Asp Gly Ile Met
370 375 380

Ala Tyr His Gln Glu Pro Pro Gly Lys Glu Asn Glu Thr Asp Arg Glu
385 390 395 400

Ala Gly Lys Asn Ile Thr Leu Asp Ile Met Arg Glu Lys Val Pro Tyr
405 410 415

Ile Tyr Arg Lys Leu Leu Pro Ile Glu Asp Ser His Ile Asn Arg Val
420 425 430

Pro Leu Val Ser Ile Tyr Ile Pro Ala Tyr Asn Cys Ala Asn Tyr Ile
435 440 445

Gln Arg Cys Val Asp Ser Ala Leu Asn Gln Thr Val Val Asp Leu Glu
450 455 460

Val Cys Ile Cys Asn Asp Gly Ser Thr Asp Asn Thr Leu Glu Val Ile
465 470 475 480

Asn Lys Leu Tyr Gly Asn Asn Pro Arg Val Arg Ile Met Ser Lys Pro
485 490 495

Asn Gly Gly Ile Ala Ser Ala Ser Asn Ala Ala Val Ser Phe Ala Lys
500 505 510

Gly Tyr Tyr Ile Gly Gln Leu Asp Ser Asp Asp Tyr Leu Glu Pro Asp
515 520 525

Ala Val Glu Leu Cys Leu Lys Glu Phe Leu Lys Asp Lys Thr Leu Ala
530 535 540

Cys Val Tyr Thr Thr Asn Arg Asn Val Asn Pro Asp Gly Ser Leu Ile
545 550 555 560

Ala Asn Gly Tyr Asn Trp Pro Glu Phe Ser Arg Glu Lys Leu Thr Thr
565 570 575

Ala Met Ile Ala His His Phe Arg Met Phe Thr Ile Arg Ala Trp His
Page 105

580

585

590

Leu Thr Asp Gly Phe Asn Glu Lys Ile Glu Asn Ala Val Asp Tyr Asp
595 600 605

Met Phe Leu Lys Leu Ser Glu Val Gly Lys Phe Lys His Leu Asn Lys
610 615 620

Ile Cys Tyr Asn Arg Val Leu His Gly Asp Asn Thr Ser Ile Lys Lys
625 630 635 640

Leu Gly Ile Gln Lys Lys Asn His Phe Val Val Val Asn Gln Ser Leu
645 650 655

Asn Arg Gln Gly Ile Thr Tyr Tyr Asn Tyr Asp Glu Phe Asp Asp Leu
660 665 670

Asp Glu Ser Arg Lys Tyr Ile Phe Asn Lys Thr Ala Glu Tyr Gln Glu
675 680 685

Glu Ile Asp Ile Leu Lys Asp Ile
690 695

<210> 78

<211> 40

<212> PRT

<213> *Pasteurella multocida*

<400> 78

Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Asn Gly Phe Gln
1 5 10 15

Ala Ser Ala Ala Arg Asn Met Gly Leu Arg Leu Ala Lys Tyr Asp Phe
20 25 30

Ile Gly Leu Leu Asp Cys Asp Met
35 40

<210> 79

<211> 40

<212> PRT

<213> *Pasteurella multocida*

<400> 79

Gln Lys Leu Asp Ile Lys Tyr Val Arg Gln Lys Asp Tyr Gly Tyr Gln
1 5 10 15

Leu Cys Ala Val Arg Asn Leu Gly Leu Arg Thr Ala Lys Tyr Asp Phe
20 25 30

Val Ser Ile Leu Asp Cys Asp Met
35 40

<210> 80
<211> 40
<212> PRT
<213> Meleagris gallopavo

<400> 80

Glu Lys Leu Asp Ile Lys Tyr Val Arg Gln Lys Asp Tyr Gly Tyr Gln
1 5 10 15

Leu Cys Ala Val Arg Asn Leu Gly Leu Arg Thr Ala Lys Tyr Asp Phe
20 25 30

Val Ser Ile Leu Asp Cys Asp Met
35 40

<210> 81
<211> 36
<212> PRT
<213> Goose

<400> 81

Val Asp Ile Lys Tyr Val Arg Gln Lys Asp Tyr Gly Tyr Gln Leu Cys
1 5 10 15

Ala Val Arg Asn Leu Gly Leu Arg Thr Ala Lys Tyr Asp Phe Val Ser
20 25 30

Ile Leu Asp Cys
35

<210> 82
<211> 33
<212> PRT
<213> sea lion
<400> 82

Lys Tyr Val Arg Gln Lys Asp Tyr Gly Tyr Gln Leu Cys Ala Val Arg
1 5 10 15

Asn Leu Gly Leu Arg Thr Ala Lys Tyr Asp Phe Val Ser Ile Leu Asp
20 25 30

Cys

<210> 83
<211> 35

<212> PRT
<213> Artificial sequence

<220>
<223> Consensus of SEQ ID NOS:78-82

<220>
<221> misc_feature
<222> (12)..(12)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (20)..(20)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (30)..(30)
<223> Xaa can be any naturally occurring amino acid

<400> 83

Asp Ile Lys Tyr Val Arg Gln Lys Asp Tyr Gly Xaa Gln Leu Cys Ala
1 5 10 15

Val Arg Asn Xaa Gly Leu Arg Thr Ala Lys Tyr Asp Phe Xaa Ser Ile
20 25 30

Leu Asp Cys
35

<210> 84
<211> 703
<212> PRT
<213> Pasteurella multocida

<400> 84

Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Ser Asn Asp Tyr
1 5 10 15

Gln Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Ile Tyr Gly Arg
20 25 30

Lys Ile Val Glu Phe Gln Ile Thr Lys Cys Lys Glu Lys Leu Ser Ala
35 40 45

His Pro Ser Val Asn Ser Ala His Leu Ser Val Asn Lys Glu Glu Lys
50 55 60

Val Asn Val Cys Asp Ser Pro Leu Asp Ile Ala Thr Gln Leu Leu Leu
65 70 75 80

Ser Asn Val Lys Lys Leu Val Leu Ser Asp Ser Glu Lys Asn Thr Leu
Page 108

85

90

95

Lys Asn Lys Trp Lys Leu Leu Thr Glu Lys Lys Ser Glu Asn Ala Glu
100 105 110

Val Arg Ala Val Ala Leu Val Pro Lys Asp Phe Pro Lys Asp Leu Val
115 120 125

Leu Ala Pro Leu Pro Asp His Val Asn Asp Phe Thr Trp Tyr Lys Lys
130 135 140

Arg Lys Lys Arg Leu Gly Ile Lys Pro Glu His Gln His Val Gly Leu
145 150 155 160

Ser Ile Ile Val Thr Thr Phe Asn Arg Pro Ala Ile Leu Ser Ile Thr
165 170 175

Leu Ala Cys Leu Val Asn Gln Lys Thr His Tyr Pro Phe Glu Val Ile
180 185 190

Val Thr Asp Asp Gly Ser Gln Glu Asp Leu Ser Pro Ile Ile Arg Gln
195 200 205

Tyr Glu Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Tyr Gly
210 215 220

Tyr Gln Leu Cys Ala Val Arg Asn Leu Gly Leu Arg Thr Ala Lys Tyr
225 230 235 240

Asp Phe Val Ser Ile Leu Asp Cys Asp Met Ala Pro Gln Gln Leu Trp
245 250 255

Val His Ser Tyr Leu Thr Glu Leu Leu Glu Asp Asp Asp Leu Thr Ile
260 265 270

Ile Gly Pro Arg Lys Tyr Ile Asp Thr Gln His Ile Asp Pro Lys Asp
275 280 285

Phe Leu Asn Asn Ala Ser Leu Leu Glu Ser Leu Pro Glu Val Lys Thr
290 295 300

Asn Asn Ser Val Ala Ala Lys Gly Glu Gly Thr Val Ser Leu Asp Trp
305 310 315 320

Arg Leu Glu Gln Phe Glu Lys Thr Glu Asn Leu Arg Leu Ser Asp Ser
325 330 335

Pro Phe Arg Phe Phe Ala Ala Gly Asn Val Ala Phe Ala Lys Lys Trp
Page 109

340

345

350

Leu Asn Lys Ser Gly Phe Phe Asp Glu Glu Phe Asn His Trp Gly Gly
355 360 365

Glu Asp Val Glu Phe Gly Tyr Arg Leu Phe Arg Tyr Gly Ser Phe Phe
370 375 380

Lys Thr Ile Asp Gly Ile Met Ala Tyr His Gln Glu Pro Pro Gly Lys
385 390 395 400

Glu Asn Glu Thr Asp Arg Glu Ala Gly Lys Asn Ile Thr Leu Asp Ile
405 410 415

Met Arg Glu Lys Val Pro Tyr Ile Tyr Arg Lys Leu Leu Pro Ile Glu
420 425 430

Asp Ser His Ile Asn Arg Val Pro Leu Val Ser Ile Tyr Ile Pro Ala
435 440 445

Tyr Asn Cys Ala Asn Tyr Ile Gln Arg Cys Val Asp Ser Ala Leu Asn
450 455 460

Gln Thr Val Val Asp Leu Glu Val Cys Ile Cys Asn Asp Gly Ser Thr
465 470 475 480

Asp Asn Thr Leu Glu Val Ile Asn Lys Leu Tyr Gly Asn Asn Pro Arg
485 490 495

Val Arg Ile Met Ser Lys Pro Asn Gly Gly Ile Ala Ser Ala Ser Asn
500 505 510

Ala Ala Val Ser Phe Ala Lys Gly Tyr Tyr Ile Gly Gln Leu Asp Ser
515 520 525

Asp Asp Tyr Leu Glu Pro Asp Ala Val Glu Leu Cys Leu Lys Glu Phe
530 535 540

Leu Lys Asp Lys Thr Leu Ala Cys Val Tyr Thr Thr Asn Arg Asn Val
545 550 555 560

Asn Pro Asp Gly Ser Leu Ile Ala Asn Gly Tyr Asn Trp Pro Glu Phe
565 570 575

Ser Arg Glu Lys Leu Thr Thr Ala Met Ile Ala His His Phe Arg Met
580 585 590

Phe Thr Ile Arg Ala Trp His Leu Thr Asp Gly Phe Asn Glu Lys Ile
Page 110

595

600

605

Glu Asn Ala Val Asp Tyr Asp Met Phe Leu Lys Leu Ser Glu Val Gly
610 615 620

Lys Phe Lys His Leu Asn Lys Ile Cys Tyr Asn Arg Val Leu His Gly
625 630 635 640

Asp Asn Thr Ser Ile Lys Lys Leu Gly Ile Gln Lys Lys Asn His Phe
645 650 655

Val Val Val Asn Gln Ser Leu Asn Arg Gln Gly Ile Thr Tyr Tyr Asn
660 665 670

Tyr Asp Glu Phe Asp Asp Leu Asp Glu Ser Arg Lys Tyr Ile Phe Asn
675 680 685

Lys Thr Ala Glu Tyr Gln Glu Ile Asp Ile Leu Lys Asp Ile
690 695 700

<210> 85

<211> 705

<212> PRT

<213> *Pasteurella multocida*

<400> 85

Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Ser Asn Asp Tyr
1 5 10 15

Glu Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Thr Tyr Gly Arg
20 25 30

Lys Ile Val Glu Phe Gln Ile Ile Lys Cys Lys Glu Lys Leu Ser Thr
35 40 45

Asn Ser Tyr Val Ser Gln Asp Lys Lys Asn Ser Val Cys Asp Ser Ser
50 55 60

Leu Asp Ile Ala Thr Gln Leu Leu Ser Asn Val Lys Lys Leu Thr
65 70 75 80

Leu Ser Glu Ser Glu Lys Asn Ser Leu Lys Asn Lys Trp Lys Ser Ile
85 90 95

Thr Gly Lys Lys Ser Glu Asn Ala Glu Ile Arg Lys Val Glu Leu Val
100 105 110

Pro Lys Asp Phe Pro Lys Asp Leu Val Leu Ala Pro Leu Pro Asp His
115 120 125

Val Asn Asp Phe Thr Trp Tyr Lys Asn Arg Lys Lys Ser Leu Gly Ile
130 135 140

Lys Pro Val Asn Lys Asn Ile Gly Leu Ser Ile Ile Ile Pro Thr Phe
145 150 155 160

Asn Arg Ser Arg Ile Leu Asp Ile Thr Leu Ala Cys Leu Val Asn Gln
165 170 175

Lys Thr Asn Tyr Pro Phe Glu Val Val Val Ala Asp Asp Gly Ser Lys
180 185 190

Glu Asn Leu Leu Thr Ile Val Gln Lys Tyr Glu Gln Lys Leu Asp Ile
195 200 205

Lys Tyr Val Arg Gln Lys Asp Asn Gly Phe Gln Ala Ser Ala Ala Arg
210 215 220

Asn Met Gly Leu Arg Leu Ala Lys Tyr Asp Phe Ile Gly Leu Leu Asp
225 230 235 240

Cys Asp Met Ala Pro Asn Pro Leu Trp Val His Ser Tyr Val Ala Glu
245 250 255

Leu Leu Leu Glu Asp Asn Asp Ile Val Leu Ile Gly Pro Arg Lys Tyr
260 265 270

Val Asp Thr His Asn Ile Thr Ala Glu Gln Phe Leu Asn Asp Pro Tyr
275 280 285

Leu Ile Glu Ser Leu Pro Glu Thr Ala Thr Asn Asn Asn Pro Ser Ile
290 295 300

Thr Ser Lys Gly Asn Ile Ser Leu Asp Trp Arg Leu Glu His Phe Lys
305 310 315 320

Lys Thr Asp Asn Leu Arg Leu Cys Asp Ser Pro Phe Arg Tyr Phe Ser
325 330 335

Cys Gly Asn Val Ala Phe Ser Lys Glu Trp Leu Asn Lys Val Gly Trp
340 345 350

Phe Asp Glu Glu Phe Asn His Trp Gly Gly Glu Asp Val Glu Phe Gly
355 360 365

Tyr Arg Leu Phe Ala Lys Gly Cys Phe Phe Arg Val Ile Asp Gly Gly
370 375 380

Met Ala Tyr His Gln Glu Pro Pro Gly Lys Glu Asn Glu Thr Asp Arg
385 390 395 400

Glu Ala Gly Lys Ser Ile Thr Leu Lys Ile Val Lys Glu Lys Val Pro
405 410 415 420

Tyr Ile Tyr Arg Lys Leu Leu Pro Ile Glu Asp Ser His Ile His Arg
420 425 430 435

Ile Pro Leu Val Ser Ile Tyr Ile Pro Ala Tyr Asn Cys Ala Asn Tyr
435 440 445 450

Ile Gln Arg Cys Val Asp Ser Ala Leu Asn Gln Thr Val Val Asp Leu
450 455 460 465

Glu Val Cys Ile Cys Asn Asp Gly Ser Thr Asp Asn Thr Leu Glu Val
465 470 475 480

Ile Asn Lys Leu Tyr Gly Asn Asn Pro Arg Val Arg Ile Met Ser Lys
485 490 495 500

Pro Asn Gly Gly Ile Ala Ser Ala Ser Asn Ala Ala Val Ser Phe Ala
500 505 510 515

Lys Gly Tyr Tyr Ile Gly Gln Leu Asp Ser Asp Asp Tyr Leu Glu Pro
515 520 525 530

Asp Ala Val Glu Leu Cys Leu Lys Glu Phe Leu Lys Asp Lys Thr Leu
530 535 540 545

Ala Cys Val Tyr Thr Thr Asn Arg Asn Val Asn Pro Asp Gly Ser Leu
545 550 555 560

Ile Ala Asn Gly Tyr Asn Trp Pro Glu Phe Ser Arg Glu Lys Leu Thr
565 570 575 580

Thr Ala Met Ile Ala His His Phe Arg Met Phe Thr Ile Arg Ala Trp
580 585 590 595

His Leu Thr Asp Gly Phe Asn Glu Asn Ile Glu Asn Ala Val Asp Tyr
595 600 605 610

Asp Met Phe Leu Lys Leu Ser Glu Val Gly Lys Phe Lys His Leu Asn
610 615 620 625

Lys Ile Cys Tyr Asn Arg Val Leu His Gly Asp Asn Thr Ser Ile Lys
625 630 635 640

Lys Leu Gly Ile Gln Lys Lys Asn His Phe Val Val Val Asn Gln Ser
645 650 655

Leu Asn Arg Gln Gly Ile Asn Tyr Tyr Asn Tyr Asp Lys Phe Asp Asp
660 665 670

Leu Asp Glu Ser Arg Lys Tyr Ile Phe Asn Lys Thr Ala Glu Tyr Gln
675 680 685

Glu Glu Met Asp Ile Leu Lys Asp Leu Lys Leu Ile Gln Asn Lys Asp
690 695 700

Ala
705